NWA3171

Basaltic Shergottite

506 grams

Figure 1: *Complete NWA3171 stone showing flow lines in the back fusion crust on the shield-like front face. Photo by David Gregory.*

Introduction

NWA 3171 is a 506 gram stone, partially broken, partially covered with fresh fusion crust (figure 1). It was purchased in 2004 by A.A. Aaronson for D.A. Gregory and is apparently from western Algeria. It is a basaltic rock very similar to Shergotty and Zagami.

Thin veins of black glass leading to shock melt pockets can be seen in photos of the sawn surface (figure 2).

Petrography

This Martian basalt consists of approximately equal amounts of pyroxene and plagioclase (figure 3). Accessory phases include ulvospinel, ilmenite, chlorapatite, merrillite, pyrrhotite, Na-K-Al-Si glass, silica, and rare baddeleyite. Rare calcite, barite and minor rust staining are present in the dessert find (Irving *et al.* 2004).

Additional petrographic detail and figures can be found at http://www2.jpl.nasa.gov/snc/nwa3171.html.

Mineralogy

Pyroxene: The composition of pyroxene in NWA3171 is given in figure 4 (Irving et al. 2004).

Plagioclase: The plagioclase is shocked to maskelynite (An_{41-54}).

Chemistry

None reported.

Radiogenic age dating

Park and Bogard (2007) reported a $^{40}Ar/^{39}Ar$ plateau age of 225 ± 4 m.y., but found that the sample had excess ^{40}Ar inherited from the magma. There is also a component from the Martian atmosphere.

Nishiizumi and Caffee (2004) reported that the ^{10}Be exposure age was 2.5 – 3.1 m.y.

Other Studies

Oxygen isotopes for NWA3171 are delta^{18}O = 4.56 ± 0.1, delta^{17}O = 2.77 ± 0.1 and Delta^{17}O = 0.40 ± 0.06 ‰ *(as determined by T. Larson and F. Longstaffe, Univ. Western Ontario)*.

Figure 2: *Sawn surface of NWA3171 (photo by Greg Hupe).*

Figure 3: *Thin section photomicrograph showing texture of NWA3171 (photo by Tony Irving and Scott Kuehner). Scale is 1.5 cm across. Note the thin shock veinlet (black glass) and brown alteration stain.*

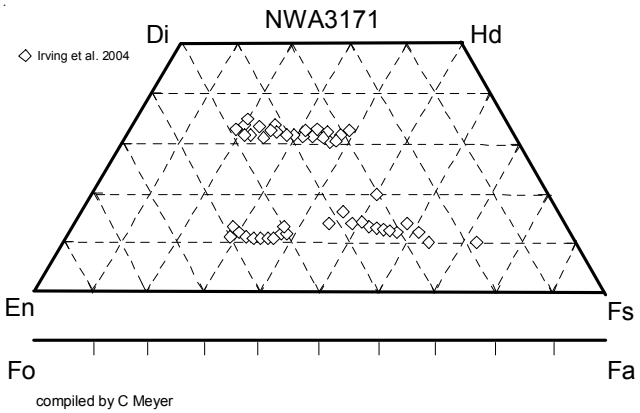

Figure 4: *Pyroxene diagram for NWA3171 (data replotted from Irving et al. 2004). Does this remind you of Zagami?*

References for NWA3171

Irving A.J., Herd C.D.K., Kuehner S.M., Gregory D.A. and Aaronson A.A. (2004b) Petrology and redox state of basaltic shergottite NWA 3171 (abs). *Meteoritics & Planet. Sci.* **39**, A49.

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Park J. and Bogard D.D. (2007) 39Ar-40Ar "age" of basaltic shergottite NWA3171 (abs#5015). *Meteoritics & Planet. Sci*. **42**, A122.